

CWHR AGRICULTURAL HABITAT DESCRIPTIONS (1999)
SUPPLEMENT TO "A GUIDE TO WILDLIFE HABITATS OF CALIFORNIA"
(Mayer and Laudenslayer, 1988)

Dryland Grain and Seed Crops (DGR)
Irrigated Grain and Seed Crops (IGR) (collectively replace Cropland)
Irrigated Hayfield (IRH)
Irrigated Row and Field Crops (IRF)
Rice (RIC)

Deciduous Orchard (DOR)
Evergreen Orchard (EOR) (collectively replace Orchard-Vineyard)
Vineyard (VIN)

Available Stages for Agricultural Types:

Dryland Grain and Seed Crops (DGR) No stages defined.
Irrigated Grain and Seed Crops (IGR)
Irrigated Hayfield (IRH)
Irrigated Row and Field Crops (IRF)

Rice 1A Non-flooded Open (<10% cover)
 IB Non-flooded Covered (≥10% cover)
 2S Flooded Shallow (<2" deep)
 2M Flooded Medium Depth (2-6" deep)
 2D Flooded Deep (≥6" deep)

Deciduous Orchard 1 Seedling/Sapling Tree (<1.5" dbh)
Evergreen Orchard 2 Young Tree (1.5-5.9" dbh)
 3 Mature Tree (≥ 6.0" dbh)

Vineyard No stages defined.

DRYLAND GRAIN AND SEED CROPS

Ronald F. Schultze

Vegetation

Structure. - Vegetation in the dryland (non-irrigated) grain and seed crops habitat includes seed producing grasses, primarily barley, cereal rye, oats, and wheat. These seed and grain crops are annuals. They are usually planted by drilling in rows which produce solid stands, forming 100 percent canopy at maturity in good stands. They are normally planted in fall and harvested in spring. However, they may be planted in rotation with other irrigated crops and winter wheat or barley may be planted after harvest of a previous crop in the fall, dry farmed (during the wet winter and early spring months), and then harvested in late spring.

Composition. - The California Agriculture - Statistical Review 1990 (California Department of Food and Agriculture, 1991) reported that 200,000 acres of barley, 40,000 acres of oats, and 614,000 acres of wheat were grown in California, for a total of 854,000 acres of grain and seed crops. About 25% of the wheat and 50-60% of the barley is grown as non-irrigated grain and seed crops (GRN) in California. Cereal rye is another type of non-irrigated grain and seed crop, but there was no report on the acreage produced in 1990.

Other Classifications. - Most vegetation classification systems include dryland (non-irrigated) grain and seed crops in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Dryland grain and seed crops do not conform to normal habitat stages. Instead, these crops are regulated by the crop cycle in California. They are all annuals. In many areas of the state a dryland crop is grown one year, then the land may be fallowed (not planted) for one or more years. The grain stubble and fallowed land may be grazed by livestock. However, the practice of grazing may reduce the vegetative cover of soil and lead to erosion problems, therefore grazing if practiced must be done with careful consideration of the erosion problem, especially on steep slopes and in wind erosion prone areas. Grazing also reduces the value of the vegetation as cover and food for wildlife.

Duration of Stages. - Dryland grain and seed crops in California are annuals. Usually they are planted in the fall and harvested the following

spring. If fallowed, volunteer native or naturalized herbaceous species grow.

Biological Setting

Habitat. - Dryland grain and seed crops occur in association with orchards, vineyards, pasture, urban, and other wildlife habitats such as riparian, chaparral, wetlands, desert, and herbaceous types.

Wildlife Considerations. - Dryland grain and seed crops are usually established on fertile soils, which historically supported an abundance of wildlife. Grain crops have reduced the wildlife habitat richness and diversity. Many species of rodents and birds have adapted to croplands and are controlled by fencing, trapping, and poisoning to prevent excessive crop losses (California Department of Food and Agriculture, 1975). Hawks, owls, and

other predators feed on the rodents in these areas. Prior to establishing State and Federal wildlife refuges, waterfowl depredation of these crops was extensive. That problem has been essentially eliminated; however, some species of waterfowl feed on the green foliage during winter months. Deer, elk, antelope, and wild pigs forage in grain fields and can cause depredation problems. Pheasants introduced to the cropland habitat have experienced recent population declines owing to changes in crop patterns and cultural practices for growing small grains. Changes include clean farming, double cropping, and chemical control of crop diseases and pests rather than leaving land fallow in alternate years.

Physical Setting

Non-irrigated grain and seed crops are often located on flat to gently rolling terrain. When flat terrain is put into crop production, it usually is leveled to facilitate irrigation. Rolling terrain is either dry farmed or irrigated by sprinklers. Soils often dictate the crops grown. Barley can grow on poor quality soils such as saline or alkaline soils. Climate also influences the types of crops grown. Only hardy crops such as potatoes, barley, cereal rye, and wheat do well in the short growing season in the Klamath Basin; whereas, in the Imperial Valley, a variety of crops grow over an eleven month, frost-free growing season.

Distribution

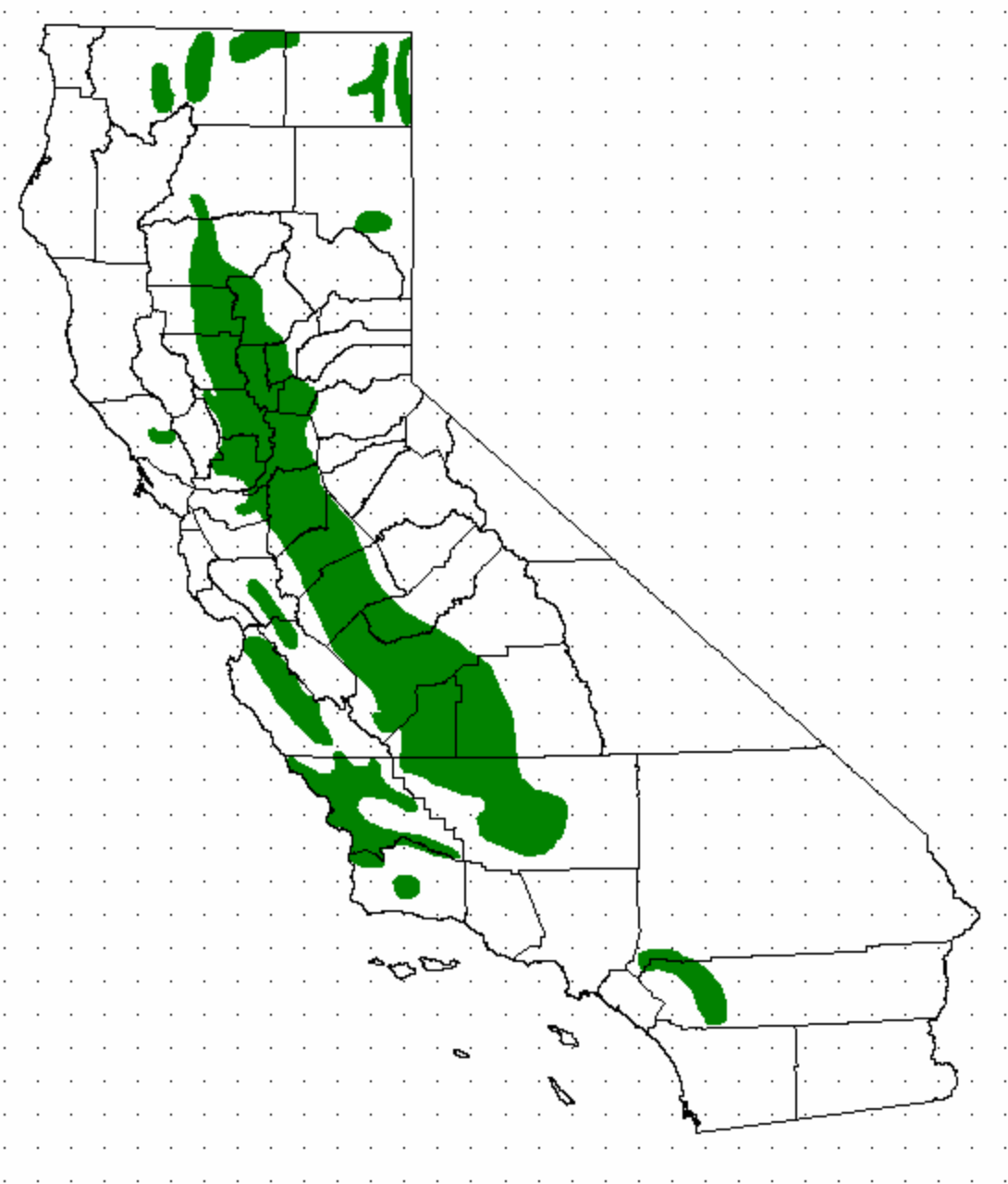
There were over 854,000 acres of barley, oats and wheat grown in California in 1990. Cereal rye is also grown, especially in northern California, but the amount grown in 1990 was not reported by the California Department of Food and Agriculture.

Literature Cited

California Department of Fish and Game. 1966. California fish and wildlife plan. California Dep. Fish and Game, Sacramento.

California Department of Food and Agriculture. 1975. Parker, I., and W. J. Matyas. 1981. CALVEG: a classification of California vegetation. U.S. Dep. Agric., For. Serv., Reg. Ecol. Group, San Francisco.

DRYLAND GRAIN AND SEED



IRRIGATED GRAIN & SEED CROPS

Ronald F. Schultze

Vegetation

Structure. - Vegetation in this habitat includes a variety of sizes, shapes and growing patterns. Field corn can reach ten feet tall while dry beans are only several inches tall. Most irrigated grain and seed crops are grown in rows. Some may form 100 percent canopy while others may have significant bare areas between rows. All seed and grain crops are annuals. They are usually planted in spring and harvested in summer or fall. However, they may be planted in rotation with other irrigated crops and sometimes winter wheat or barley may be planted after harvest of a previous crop in the fall, dry farmed (during the wet winter and early spring months) or they may be irrigated, and then harvested in the late spring.

Composition. -The California Agriculture - Statistical Review 1990 (California Department of Food and Agriculture, 1991) reported that 180,000 acres of corn, 116,600 acres of safflower, and 168,000 acres of dry beans were grown in California. About 40-50% of barley (100,000 acres) and 75% of wheat (460,000 acres) is irrigated. Milo, grain sorghum, and sunflowers are other types of irrigated grain and seed crops, but there was no report on the acreage produced in 1990. Thus there were about 1,024,000 acres of irrigated grain and seed crops (GRI) grown in California in 1990. Rice (RIC), which is another type of irrigated grain and seed crop, is identified as a different habitat type because of it's unique cultural techniques and wildlife use.

Other Classifications. - Most vegetation classification systems include irrigated grain and seed crops in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Irrigated grain and seed crops do not conform to normal habitat stages. Instead, these crops are regulated by the crop cycle in California. They are all annuals. Crop rotation systems are common in California. The system rotates crop types (usually between annuals but may include perennials such as alfalfa) to conserve soil nutrients, thus maintaining soil productivity. Crop rotation is also useful in breaking crop pest life cycles, thus reducing pest populations.

Duration of Stages. - Irrigated grain and seed crops in California are annuals and are usually managed in a crop rotation system. Generally, the crop rotation system employs a combination of annual and perennial crops on a 5-7 year rotation. For example, in the San Joaquin valley, cotton will be planted and maintained for 3 years, followed by 3 years of alfalfa and 1 year of grain. In Imperial and Ventura Counties crops are cultivated year-round. Double and triple cropping is a common practice in some areas. After the first crop is harvested, a second and sometimes a third crop is planted and harvested depending on species and climate. For example, in Ventura County, on the Oxnard plain, cool weather crops such as lettuce and cabbage are grown in the fall and winter followed by tomatoes, or peppers in the spring and summer.

Biological Setting

Habitat. -Irrigated grain and seed crops occur in association with orchards, vineyards, pasture, urban, and other wildlife habitats such as riparian, chaparral, wetlands, desert, and herbaceous types.

Wildlife Considerations. - Irrigated grain and seed crops are established on the State's most fertile soils, which historically supported an abundance of wildlife unequalled in other sites. Croplands have greatly reduced the wildlife habitat richness and diversity in California. Many species of rodents and birds have adapted to croplands and are controlled by fencing, trapping, and poisoning to prevent excessive crop losses (California Department of Food and Agriculture, 1975). Hawks, owls and other predators feed on these rodents. Prior to establishing State and Federal wildlife refuges, waterfowl depredation of crops was extensive. That problem has been essentially eliminated; however, some species of waterfowl depend on waste rice and corn that remain in the fields after harvesting (California Department of Fish and Game, 1983). Deer, elk, antelope, and wild pigs forage in alfalfa and grain fields and can cause depredation problems. Pheasants introduced to the cropland habitat have experienced recent population declines owing to changes in crop patterns and cultural practices for growing small grains. Changes include clean farming, double cropping, and chemical control of diseases and pests rather than leaving land fallow in alternate years. Except for insectivores, raptors, doves, and pheasants, avian wildlife that becomes numerous and uses crops before they are harvested are generally not welcome by growers. Wildlife such as waterfowl, sandhill cranes, and other species that use waste grains after harvest are usually not discouraged. Croplands flooded for weed control, leaching, irrigation, or waterfowl hunting serve as freshwater wetlands for a variety of associated wetland wildlife, including shorebirds, wading birds, and gulls. Availability of irrigation water during dryer months also benefits many wildlife species as a source of water.

Physical Setting

Irrigated grain and seed crops are located on flat to gently rolling terrain. When flat terrain is put into crop production, it usually is leveled to facilitate irrigation. Rolling terrain is either dry farmed or irrigated by sprinklers. Soils often dictate the crops grown. Corn requires better soils than barley, which can grow on poor quality soils such as saline and alkaline soils. Rice and barley can do well on clay soils not suitable for other crops. Leaching can remove contaminants in areas of high salt or alkali levels, making the soils highly productive. This has occurred extensively in the San Joaquin and Imperial valleys. Climate also influences the types of crops grown. Only hardy crops such as potatoes, barley, cereal rye, and wheat do well in the short growing season in the Klamath Basin; whereas, in the Imperial Valley, a variety of crops grow over an eleven month, frost-free growing season.

Distribution

There were over 1,024,000 acres of irrigated barley, wheat, corn, safflower, and dry beans grown in California in 1990. Other crops such as milo, grain sorghum and sunflower were also grown, but amounts were not reported for 1990.

Literature Cited

California Department of Fish and Game. 1966. California fish and wildlife plan. California Dep. Fish and Game, Sacramento.

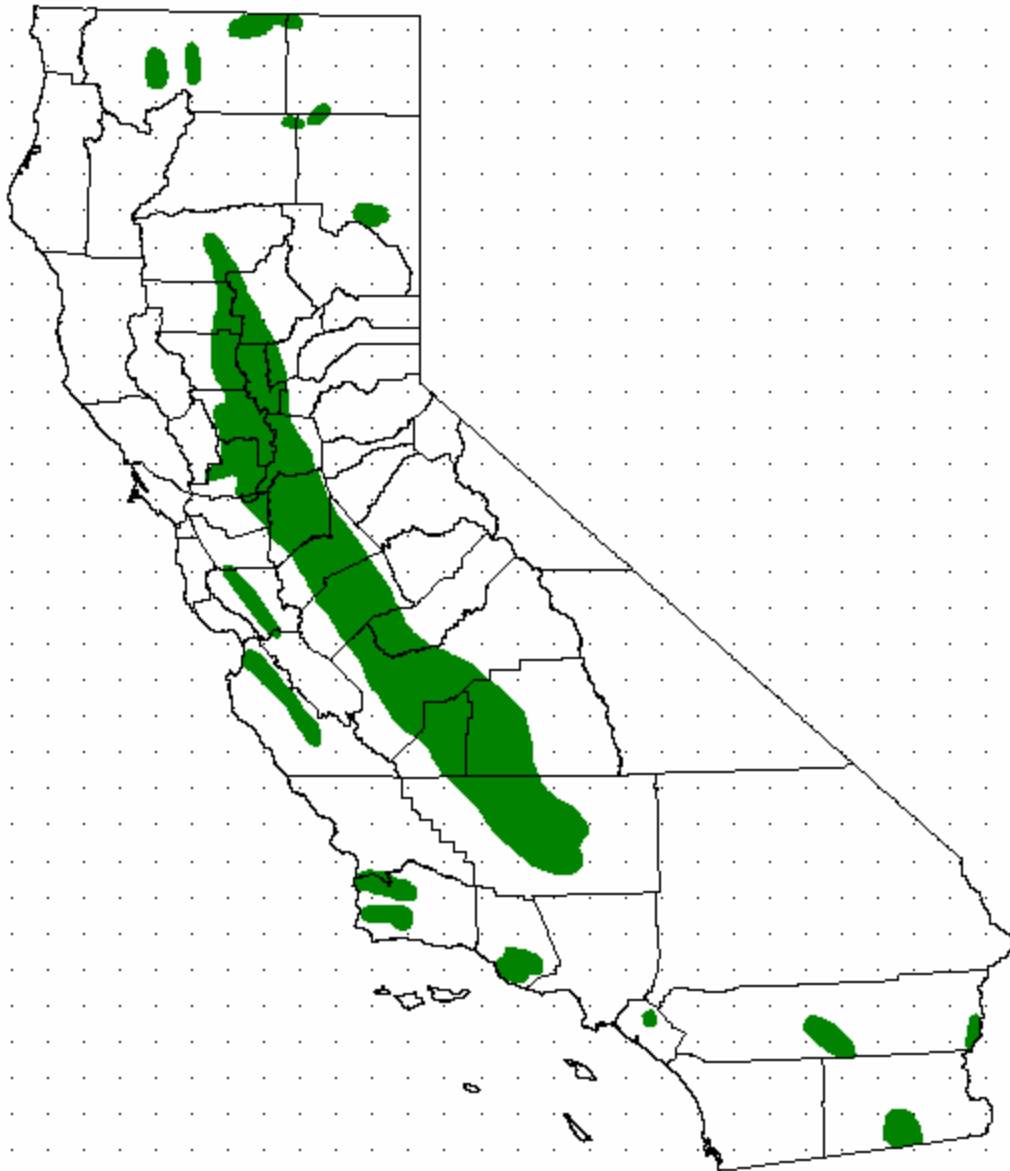
California Department of Fish and Game. 1983. A plan for protecting, enhancing, and increasing California's wetlands for waterfowl. California Dep. Fish and Game, Sacramento.

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U.S. Dep. Agric., For. Serv., Reg. Ecol. Group, San
Francisco

IRRIGATED GRAIN AND SEED



IRRIGATED HAYFIELD

E. Lee Fitzhugh and Ronald F. Schultze

Vegetation

Structure. -- Except for 2 to 6 months initial growing period, depending on climate, and soil, this habitat is dense, with nearly 100 percent cover. Average height is about 0.46 m. (1.5 feet) tall. Planted fields generally are monocultures (the same species or mixtures of a few species with similar structural properties). Structure changes to a lower stature following each harvest, grows up again and reverts to bare ground following plowing or discing. Plowing may occur annually, but is usually less often. Layering generally does not occur in this habitat. Unplanted "native" hay fields may contain short and tall patches. If not harvested for a year, they may develop dense thatches of dead leaves between the canopy and the ground.

Composition. -- This habitat includes alfalfa fields and grass hayfields. (Cereal grain fields, whether harvested for hay, grain or straw, should be classified as IGR or DGR.) Alfalfa usually exists unplowed for approximately 3 years or more, followed by a cereal grain crop, vegetables, potatoes or tomatoes for 1-4 years before being planted to alfalfa again. Most hay fields in the warmer parts of California are monocultures of alfalfa. In cooler areas, both alfalfa and introduced grass hay are common and are regularly irrigated. Occasionally, "native" hay fields are irrigated to enhance their productivity. Native hay fields may include introduced grasses and forbs, but they are managed less intensively and contain a variety of naturally-occurring graminoids and forbs as well. Alfalfa fields generally will be monocultures except for weeds and small inclusions of roads and ditches. Roads will be mostly barren, while ditchbanks, if vegetated, will support plants similar to those found in FEW. The mixture of grasses and forbs (mostly legumes) varies according to the region of the state (climate, soils, seed mixture used, tillage, irrigation, years since initial planting, and weed control).

Similar Habitats. -- Designation of a grassy hayfield as IRH depends more on management of the site than on plant composition. Hayfields are irrigated, intensively mowed and managed, whereas the same vegetation, allowed to grow in a more natural state might be a sedge, wet meadow, or perennial grassland habitat. Similar CWHR habitats are FEW, PAS, PGR, and WTM. The primary difference is that IRH is irrigated and occasionally plowed, mowed, and planted. PAS may also have these characteristics, but is more intensively grazed than IRH. Montane "native hay" pastures that are irrigated, mowed, and grazed belong in IRH if they are allowed to regrow so that by the end of the growing season and through the winter they have a substantial height of vegetation. Otherwise, they belong in the PAS type.

Other Classifications. -- Except in the case of "native hay," agricultural habitats are included only in the U.S. (UNESCO) Vegetation Cover Classification System (USVCCS). IRH would include at least three USVCCS formations corresponding to close-grown herbaceous crops in annual and perennial temperate grassland or forb vegetation categories. IRH could include 10 of the sedge and meadow series of Sawyer and Keeler-Wolf (1995). Most rushes (*Cyperus* spp.) are included by Sawyer and Keeler-Wolf (1995) in their sedge types. Spikerush (*Eleocharis* spp.), which they treat separately, is more typically a FEW species, but may occur as inclusions in a larger "native hay" IRH stand.

Habitat Stages

Vegetation Changes. -- In warmer areas and on better soils, alfalfa is part of a regular 7-8-year crop rotation. In this setting, alfalfa renews soil nitrogen, improves tilth, and can reduce disease and weeds in the vegetable and grain parts of the rotation.

Alfalfa is present for 4 years and is not plowed or disked during this time. Alfalfa also is grown where climate or soil is less adaptable to other crops. An Alfalfa-grain or Alfalfa-potato rotation is common in the Great Basin areas. Alfalfa fields may be plowed every 3-6 years, removing some weedy growth, and replanted to alfalfa. In both alfalfa and grass-hay tall and short stages are dictated by management more than by plant growth. Grass hayfields vary from annually-planted introduced grasses in warm climates to naturally-occurring perennial grasses and sedges in colder climates. Mixtures of annual and perennial, native and introduced species are common. In some "native" hay fields there can be relatively long periods of continuous inundation, on the order of one or more months, usually in winter or spring. Cattails or bulrushes may invade, but they are controlled by management. Vegetation changes are possible with management.

Duration of Stages. -- Growth begins during February in Central Valley alfalfa fields. Alfalfa harvesting occurs 3-4 times per season in intermountain areas, 6-8 times in the Central Valley, and 8-9 times in the Imperial Valley. In the Imperial Valley and the Central Valley, harvesting occurs about monthly during most of the season. At high elevations native hay usually is harvested in June, but later harvesting occurs where owners or managers are concerned about bird nesting. Plowing or disking is infrequent.

Biological Setting

Habitat.-- In most areas, rotational field crops, vineyards, or orchards will grow on adjacent areas. Natural plant communities that may occur adjacent to IRH include many flat-land, deep-soil communities from sagebrush and annual grassland to desert grassland, alkali desert scrub or creosote desert scrub, depending on the location. At higher elevations, IRH may be adjacent to coniferous forest types. This habitat sometimes exists where soil, water, topography, or climatic conditions limit growth of other crops.

If abandoned, alfalfa fields will be replaced naturally by invasive exotic plants, which may be different from those that occupied the site before tilling. Imperial Valley and Central Valley fields occupying alkaline soils, if abandoned, could revert to patchy saltgrass, salt-tolerant shrubs, and unvegetated alkaline flats. Abandoned intermountain alfalfa fields may revert to cheatgrass and Russian thistle, while native hay fields will develop a dense thatch and decadent plants.

Wildlife considerations.-- This habitat provides a high quality seasonal resource for blackbirds, deer, doves, egrets, elk, foxes, garter snakes, gophers, gopher snakes, hawks, kingsnakes, owls, pronghorn, sandhill cranes, voles, waterfowl, and others. If rotational cropland is adjacent, this habitat provides cover during seasonal disking and planting on the rotated fields.

Physical Setting

This habitat occurs in variable climates, from hot and dry to cool and wet to cold and snowy. IRH requires relatively flat topography that allows irrigation or water-spreading. Soils are highly variable but usually more than 1 meter (3.3 feet) deep and often of alluvial origin.

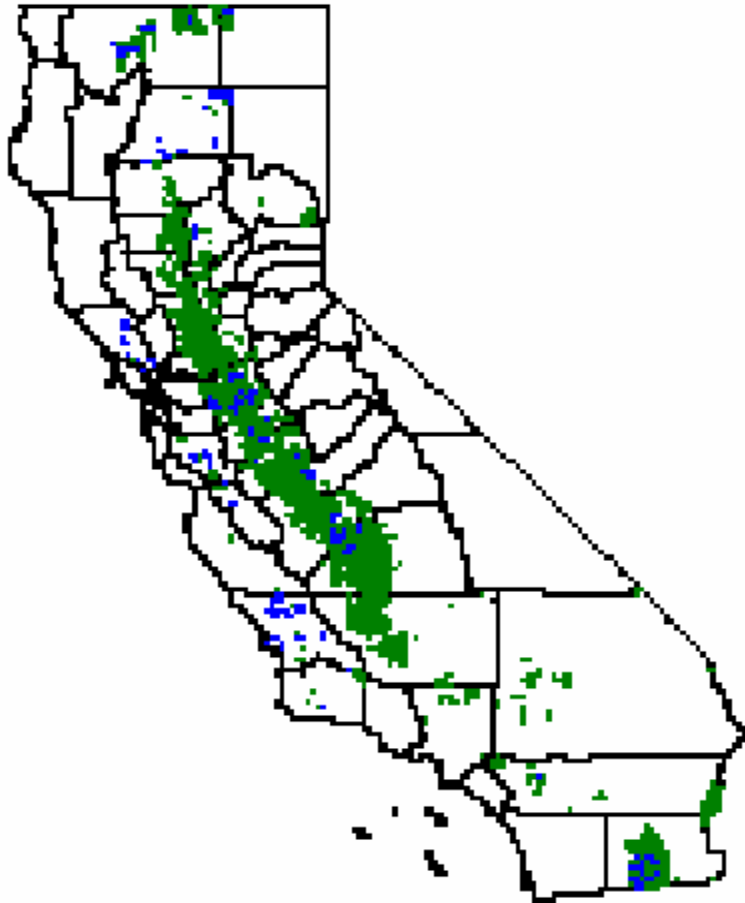
Distribution

This habitat is found throughout California from below sea level to about 2100 m (7,000 feet). Typical examples are found in Imperial Valley and Modoc County, representing different extremes, and in San Joaquin County, representing a more central form. Agricultural databases that could be used to represent abundance and distribution do not define IRH as we do, and can provide misleading estimates. However, our best estimate, based on a Natural Resources Conservation Service (NRCS 1997) tabulation of Agricultural Commissioners' crop reports for 1996 is that California supports more than 405,000 ha. (1,000,000 acres) of hayfields.

Literature Cited

NRCS. Unpublished. Crop residue management survey: worksheet for 1997, based on Agricultural Commissioners' Agricultural Crop Reports for 1996. USDA, Natural Resources Conservation Service, Davis, CA.

IRRIGATED HAYFIELD



Source: California Department of Pesticide Regulation, 2000

IRRIGATED ROW AND FIELD CROPS

Ronald F. Schultze

Vegetation

Structure. - Vegetation in this habitat includes a variety of sizes, shapes and growing patterns. Cotton and asparagus can be three or four feet tall while others may be a foot or less high. Most irrigated row and field crops are grown in rows. Some may form 100 percent canopy while others may have significant bare areas between rows. Most are annuals, while others, such as asparagus and strawberries are perennial. The annuals are usually planted in spring and harvested in summer or fall. However, they may be planted in rotation with other irrigated crops and sometimes winter wheat or barley may be planted after harvest of a previous crop in the fall, dry farmed (during the wet winter and early spring months), and then harvested in the late spring. In some areas of southern California three crops may be grown in a year.

Composition. - The California Agriculture - Statistical Review 1990 (California Department of Food and Agriculture, 1991) reported that 2,290,800 acres of row and field crops were produced commercially in 1990. Following is a summary of the top 18 row and field crops grown in 1990:

Asparagus		acres
	35,900	
Broccoli		"
	97,500	
Carrots		"
	56,100	
Cauliflower		"
	51,300	
Celery		"
	24,800	
Cucumbers		"
	4,700	
Lettuce	162,200	"
Cantaloupes		"
	83,900	
Honeydew melons		"
	19,000	
Other melons		"
	3,500	
Onions		"
	39,000	
Peppers, Chili		"
	4,100	
Tomatoes		"
	348,000	

Strawberries		"
	20,000	
Cotton	1,115,000	"
Potatoes		"
	50,000	
Sweet potatoes		"
	8,300	
Sugar Beets	<u>167,000</u>	"
TOTAL	2,290,000	acres

Artichokes, brussel sprouts, cowpeas, garlic, mustard greens, spinach, and vegetable and flower seeds are other types of row and field crops, but there was no acreage reported in the 1990 report. All of these crops are irrigated in California.

Other Classifications. - Most vegetation classification systems include row and field crops in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Row and field crops do not conform to normal habitat stages. Instead, these crops are regulated by the crop cycle in California. Crops such as broccoli, cantaloupes and other melons, garlic, onions, and lettuce are annuals or grown as annuals (some are botanically biennials), while crops such as asparagus and strawberries are perennials. Crop rotation systems are common in California. These systems rotate crop types (usually between annuals but may include perennials such as alfalfa) to conserve soil nutrients, thus maintaining soil productivity, and to break crop pests life cycles.

Duration of Stages. - Row and field crops in California are mostly annuals and are usually managed in a crop rotation system. Alfalfa is a perennial that is often included within the crops rotation, in part because it fixes nitrogen in the soil. Generally, the crop rotation system employs a combination of annual and perennial crops on a 5-7 year rotation. For example, in the San Joaquin valley, cotton will be planted and maintained for 3 years, followed by 3 years of alfalfa and 1 year of grain. In Imperial and Ventura Counties crops are cultivated year-round. Double and triple cropping is a common practice in some areas. After the first crop is harvested, a second and sometimes a third crop is planted and harvested depending on species and climate. For example, in Ventura County, on the Oxnard plain, cool weather crops such as lettuce and cabbage are grown in the fall and winter followed by tomatoes, corn, or peppers in the spring and summer. However, exceptions do exist, for example sugar beets, winter wheat, and barley are planted in the summer or fall and harvested the following spring.

Biological Setting

Habitat. -Row and field crops occur in association with orchards,

vineyards, pasture, urban, and other wildlife habitats such as riparian, chaparral, wetlands, desert, and herbaceous types.

Wildlife Considerations. - Row and field crops are established on the State's most fertile soils, which historically supported an abundance of wildlife unequalled in other sites. Croplands have greatly reduced wildlife habitat richness and diversity in these areas of California. Many species of rodents and birds have adapted to croplands and are controlled by fencing, trapping, and poisoning to prevent excessive crop losses (California Department of Food and Agriculture, 1975). Prior to establishing State and Federal wildlife refuges, waterfowl depredation of crops was extensive. That problem has been essentially eliminated. Deer, elk, antelope, and wild pigs forage in alfalfa and on some other row and field crops and can cause depredation problems. Pheasants introduced to the cropland habitat have experienced recent population declines owing to changes in crop patterns and cultural practices for growing these crops. Changes include clean farming, double cropping, and chemical control of diseases and pests rather than leaving land fallow in alternate years. Except for insectivores, raptors, and doves for example, some birds and mammals (e.g., rodents, rabbits) that become too numerous can cause serious crop losses and are generally not welcomed by growers. Availability of irrigation water during dryer months benefits many wildlife species as a source of water.

Physical Setting

Row and field crops are located on flat to gently rolling terrain. When flat terrain is put into crop production, it usually is leveled to facilitate irrigation. Rolling terrain usually irrigated by sprinklers. Soils often dictate the crops grown. Cotton and sugar beets can grow on poor quality, alkaline soils, these soils are not suited for many row and field crops unless leaching of salts is practiced. Leaching can remove contaminants in areas of high salt or alkali levels, making the soils highly productive. This has occurred extensively in the San Joaquin and Imperial valleys. Climate also influences the types of crops grown. Only hardy crops such as potatoes, barley, cereal rye, and wheat do well in the short growing season in the Klamath Basin; whereas, in the Imperial Valley, a variety of crops grow over an eleven month, frost-free growing season.

Distribution

There were over 2,290,800 acres of row and field crops grown in California in 1990.

Literature Cited

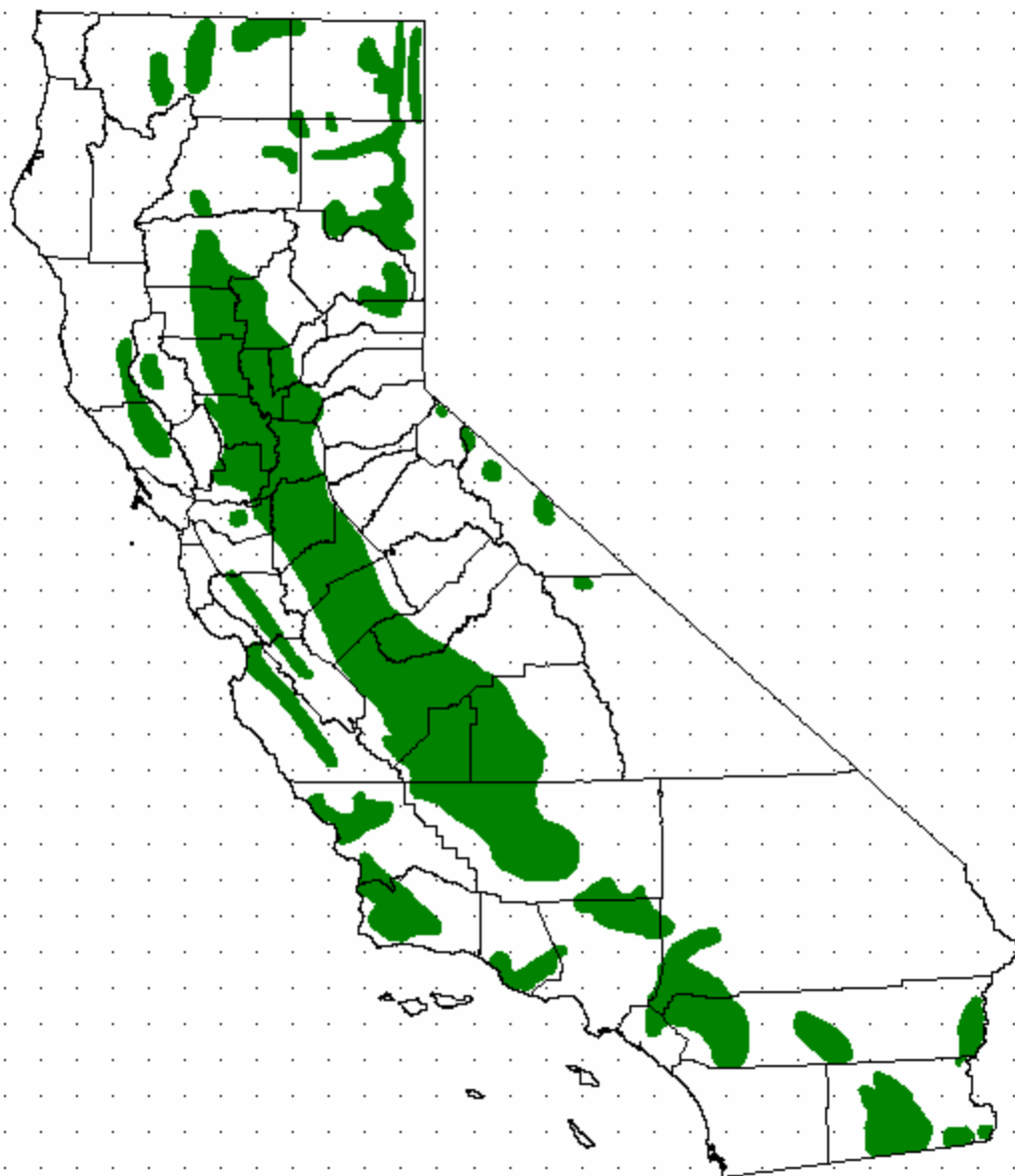
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Parker, I. and W. J. Matyas. 1981. CALVEG: a classification of California vegetation. U.S. Dep. Agric., For. Serv., Reg. Ecol. Group, San Francisco.

IRRIGATED ROW AND FIELD CROPS



RICE

Ronald F. Schultze

Vegetation

Structure. - Rice and wild rice are flood irrigated crops that are seed producing annual grasses. Commercial rice generally is only a couple of feet tall, whereas, commercially grown wild rice may be six feet tall or taller. They are usually grown in leveed fields that are flooded much of the growing period, and dried out to mature and to facilitate harvesting. They usually produce 100 percent canopy closure as they mature. They are usually planted in spring and harvested in fall.

Composition. - The California Agriculture - Statistical Review 1990 (California Department of Food and Agriculture, 1991) reported that 385,000 acres of rice was grown in California in 1990. Wild rice was not reported by the Department of Food and Agriculture for 1990.

Other Classifications. - Most vegetation classification systems include rice in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Rice does not conform to normal habitat stages, however it is similar to seasonally flooded wetlands. Rice is an annual. Crop rotation systems are common with rice in California. They may be planted in rotation with other irrigated crops and especially winter wheat or barley. Winter wheat or barley may be planted in the fall, dry farmed, and then harvested the following spring. This is often done for weed control, drying of the soil and to control rice root diseases. Some acres may be fallowed or placed in set-aside programs for a year or more; sometimes planted to legumes such as vetches which fix nitrogen in the soil.

Duration of Stages. - Rice is an annual, usually planted in the spring and harvested in the fall.

Biological Setting

Habitat. - Rice occurs in association with other croplands in the Central Valley of California and other wildlife habitats such as riparian, and wetlands. Wild rice is grown similarly in the Central Valley, but also is grown in northern California where it may occur near annual grassland, riparian, wetland, and brushland habitat types.

Wildlife Considerations. - Rice is grown usually in heavier clayey soils that hold water well. Many of these soils once supported natural wetlands which historically supported an abundance of wildlife, especially waterfowl and shorebirds. Although other croplands have greatly reduced the wildlife richness and diversity of California, rice has been more compatible. Many species of wildlife and especially waterfowl, shorebirds and wading birds have adapted to rice. Prior to establishing State and Federal wildlife

refuges, waterfowl depredation of rice was extensive. That problem has been reduced; however, some species of waterfowl depend on waste rice that remains in the fields after harvesting. Pheasants have also benefited from rice, but pheasants have experienced recent population declines owing to changes in crop patterns and cultural practices for growing small grains. Changes include clean farming, double cropping, laser leveling and straight or "squared" levees as apposed to contour levees, and chemical control of rice diseases and pests rather than leaving land fallow in alternate years are examples of problems. Wildlife such as waterfowl, sandhill cranes, and other species that use waste grains after harvest are usually not discouraged. Rice fields flooded after harvest with waste grain and for waterfowl hunting serve as freshwater wetlands for a variety of associated wetland wildlife, including shorebirds, wading birds, and gulls.

Physical Setting

Rice is usually located on flat terrain. When flat terrain is put into rice production, it usually is leveled to facilitate irrigation. Rice can grow on poor quality soils, and rice and barley can do well on clay soils not suitable for other crops. Leaching or flushing can remove contaminants in areas of high salt or alkali levels, making the soils more productive. This has occurred in both the San Joaquin and Sacramento valleys.

Distribution

There were over 385,000 acres of rice grown in California in 1990. Wild rice is grown in the central valley along with other commercial rice. Wild rice is also grown in northern California, such as in Fall River Valley, where it is too cold for other commercial rice production.

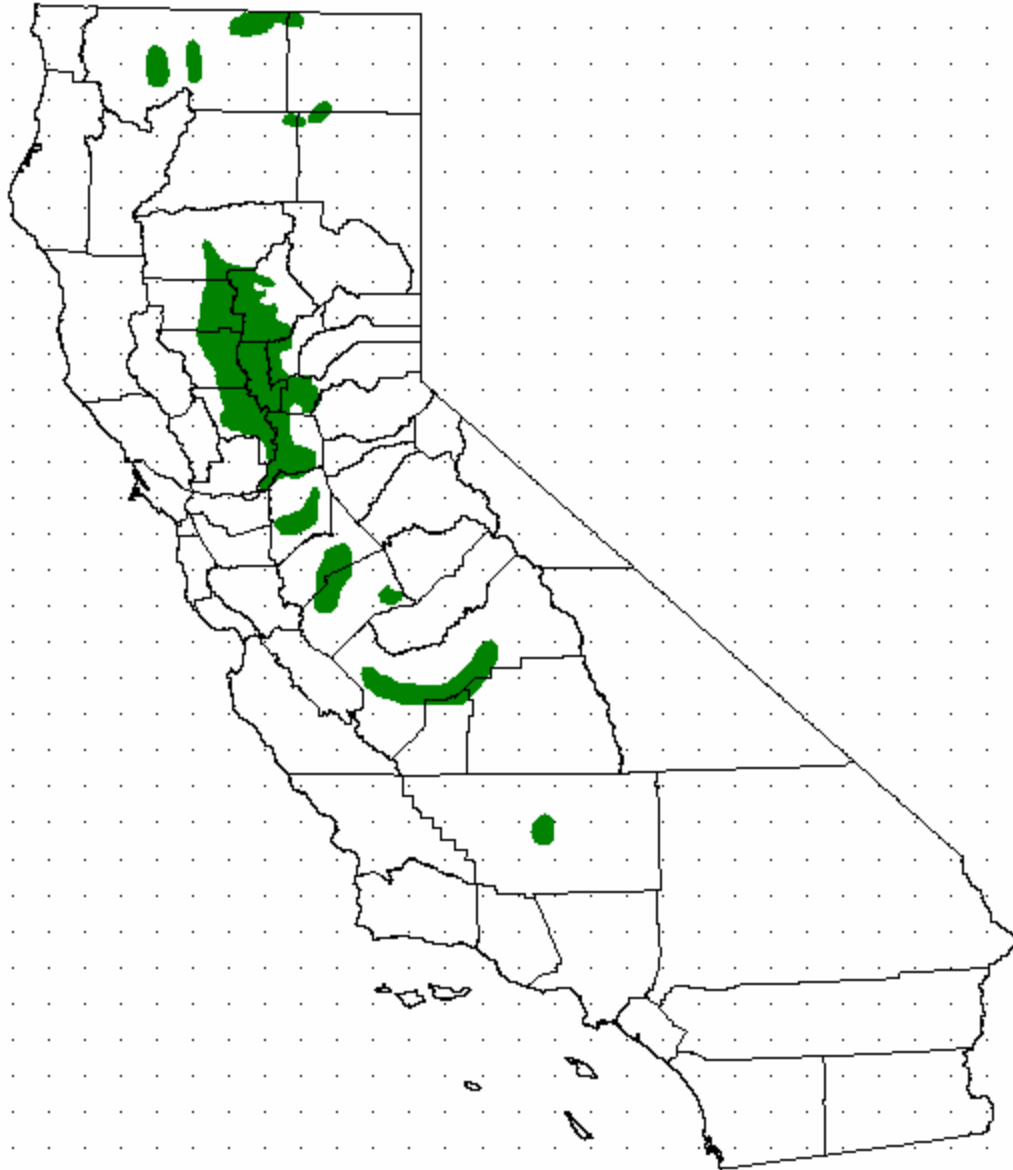
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RICE



DECIDUOUS ORCHARD

Ronald F. Schultze

Vegetation

Structure. - Deciduous orchards in California are typically open single species tree dominated habitats. Depending on the tree type and pruning methods they are usually low, bushy trees with an open understory to facilitate harvest. Deciduous orchards include trees such as almonds, apples, apricots, cherries, figs, nectarines, peaches, pears, pecans, pistachios, plums, pomegranates, prunes and walnuts. Trees range in height at maturity for many species from 5 to 10 m (15 to 30 ft), but may be 3 m (10 ft) or less in pomegranates and some dwarf varieties, or 18 m (60 ft) or more in pecans and walnuts (Sunset, 1972). Crowns usually touch, and are usually in a linear pattern. Spacing between trees is uniform depending on desired spread of mature trees. The understory is usually composed of low-growing grasses, legumes, and other herbaceous plants, but may be managed to prevent understory growth totally or partially, such as along tree rows.

Composition. - The California Agriculture - Statistical Review 1990 (California Department of Food and Agriculture, 1991) indicated that of the 14 deciduous orchard crops mentioned above there were about 942,300 acres in production. Acres by type were approximately:

Almonds	411,00	acres
Apples	31,000	"
Apricots	16,700	"
Cherries	10,600	"
Figs	16,700	"
Nectarines	25,400	"
Peaches	54,400	"
Pears	23,300	"
Pecans	2,600	"
Pistachios	49,800	"
Plums	41,700	"
Prunes	78,000	"
Walnuts	<u>181,000</u>	"

TOTAL 942,300 acres

The understory in deciduous orchards often has herbaceous annuals and perennials during the winter months. In some orchards cover crops of resident species (weeds) are present year round or are cultivated in the spring and summer. Many orchards are treated in strips down the tree rows with herbicides. The cover crop can be composed of either natural or planted domesticated herbaceous plants. Natural herbaceous plants commonly consist of perennial grasses such as Bermuda or johnsongrass; or annual grasses such as soft chess, annual ryegrass, wild oats, red brome, red fescue, barnyard grass, and others; or forbs such as wild mustard, fiddleneck, and filaree, depending on seed sources in the area.

Numerous grasses and legumes are planted as cover crops in deciduous orchards either as single species or in mixes. Cover crops of domesticated grasses and legumes generally fall into four categories (Finch and Sharp, 1981):

- 1) Annually seeded winter growing grasses and legumes such as cereal rye, barley, oats, annual ryegrass or purple vetch;
- 2) Reseeding winter annual grasses and legumes such as Blando brome, Zorro annual fescue, Wimmera-62 ryegrass, annual bluegrass, Lana woolypod vetch, rose clover, crimson clover, bur clover, subclover, and black medic;
- 3) Summer annuals such as Sudan grass, grain, sorghums, and California blackeye bean; and
- 4) Perennial grasses and legumes such as tall fescue, creeping red fescue, orchardgrass, perennial ryegrass, narrowleaf trefoil, Salina strawberry clover, and ladino clover.

Other Classifications. - Most vegetation classification systems include deciduous orchards in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Deciduous orchards are planted in uniform patterns and intensively managed. They are usually established as sapling trees (2), and most are managed to grow to small trees (4) size. However, trees such as pecans and walnuts grow to size class medium/large trees (5). Canopy closure classes range from sparse (S) to dense (D). As trees become old or in some way damaged or diseased they are usually replaced. In some cases however, entire orchards may be replaced with young trees. A few orchards have been abandoned, especially in the gold rush country of the Sierra Nevada Mountains, and in coastal areas. They are eventually invaded by naturalized or native herbaceous plants followed by shrubs and trees. Orchards usually have some growth of herbaceous plants in the understory.

Duration of Stages. - Duration of deciduous orchards vary depending on species. Fruit and nut trees are long lived. However most are replaced at

approximately 20-40 years old. Replacement of such orchards is usually a result of product price fluctuations or a decline in productivity.

Biological Setting

Habitat. - Orchards are typically associated with other agricultural types such as Irrigated Grain and Seed Crops (GRI), Row and Field Crops (RFC), Pasture PAS). Some are near urban (URB) types. They are frequently associated with Valley-Foothill Riparian (VRI) areas, shrub habitats (Mixed chaparral (MCH), herbaceous types such as Annual Grasslands (AGS), a few tree types such as Valley-Foothill Hardwood (VFH), Valley-Foothill Hardwood-Conifer (VHC), and Ponderosa Pine (PPN).

Wildlife Considerations. - Orchards have been planted on deep fertile soils which once supported productive and diverse natural habitats. Larger and more diverse populations of wildlife were also supported by these native habitats. However, some species of birds and mammals have adapted to the orchard habitats. Many have become "agricultural pests" which has resulted in intensive efforts to reduce crop losses through fencing, sound guns, or other management techniques. Wildlife such as deer and rabbit browse on the trees; other wildlife such as squirrel and numerous birds feed on fruit or nuts. Some wildlife (e.g. morning dove, California quail) are more passive in their use of the habitat for cover and nesting sites. Deciduous orchards can be especially beneficial to wildlife during hot summer periods. However, they provide much less cover from rain and cold during the winter months when leaves have dropped. Water can be beneficial in irrigated orchards. Many wildlife species act as biological control agents by feeding on weed seeds and insect pests. The literature is generally lacking on wildlife associated with these habitats except as it relates to pests and pest control. Martin et al. (1951) gives an overview of wildlife use of plants for food. Examples of wildlife reported to commonly feed on nuts (almonds and walnuts) include northern flicker, scrub jay, American crow, plain titmouse, Brewer's blackbird, house finch, gray squirrel and California ground squirrel. Some other orchard crops such as apples, cherries, figs, pears and prunes are also eaten by these same species plus others such as band-tailed pigeon, yellow-billed magpie, western bluebird, American robin, varied thrush, northern mockingbird, cedar waxwing, yellow-rumped warbler, black-headed grosbeak, Bullock's oriole, desert cottontail, western gray squirrel, coyote, black bear, raccoon, and mule deer.

Physical Setting

Deciduous orchards can be found on flat alluvial soils in the valley floors, in rolling foothill areas, or on relatively steep slopes. Though some deciduous orchards are non-irrigated, most are irrigated. Some flat soils are flood irrigated, but many deciduous orchards are sprinkler irrigated. Large numbers of orchards are irrigated by drip or trickle irrigation systems. Most deciduous orchards are in valley or foothill areas, with a few such as apples and pears, up to 3000 feet elevation.

Distribution

In 1990 there were nearly 942,300 acres of deciduous orchards in California. Commercial deciduous orchards are grown in nearly every county

except Alpine, Lassen, Modoc, Mono, Plumas, San Francisco, and Trinity counties.

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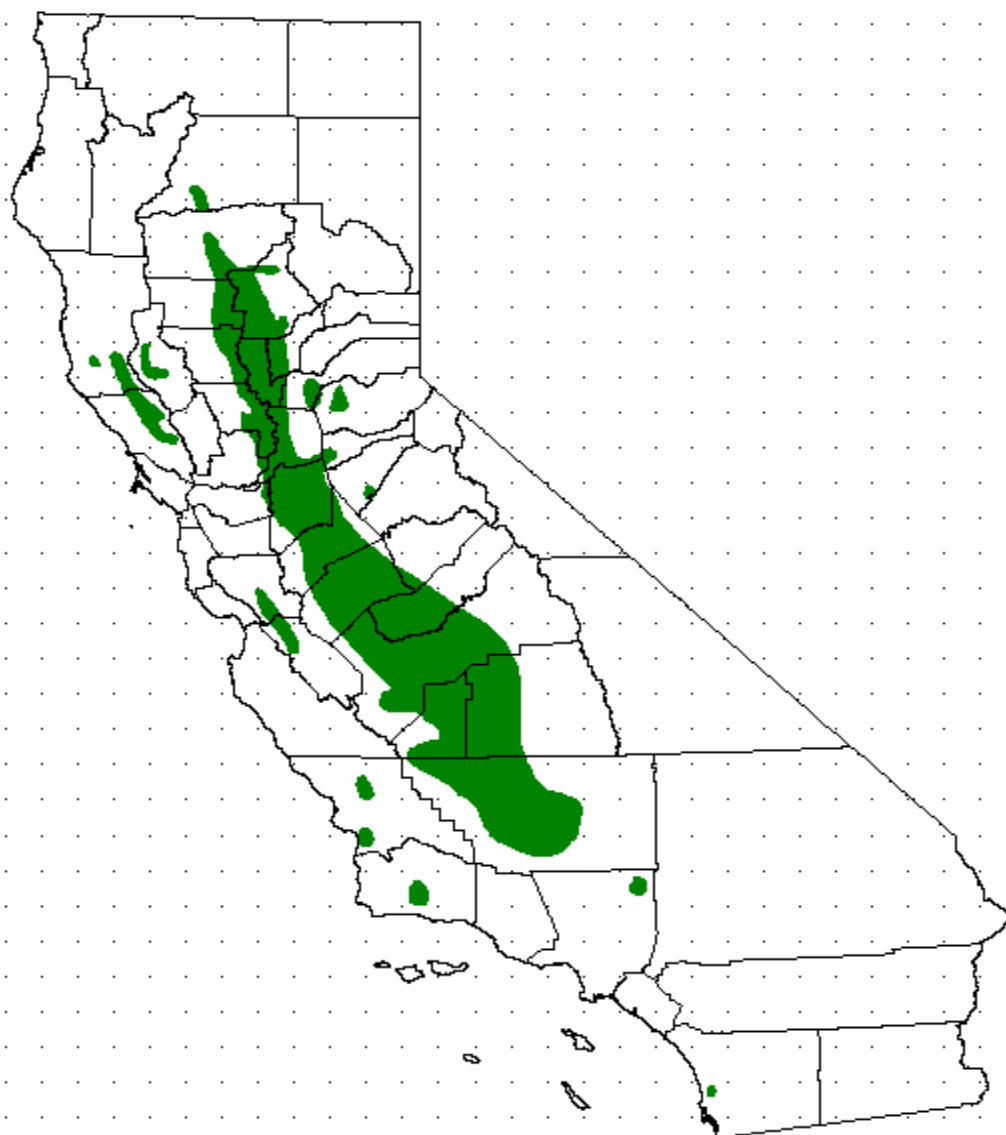
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DECIDUOUS ORCHARD



EVERGREEN ORCHARD

Ronald F. Schultze

Vegetation

Structure. - Evergreen orchards in California are typically open single species tree dominated habitats. Depending on the tree type and pruning methods they are usually low, bushy trees with an open understory to facilitate harvest. Evergreen orchards include trees such as avocados, dates, grapefruit, lemons, limes, olives, oranges, tangerines, tangelos and tangors. Trees range in height at maturity for many species from 5 to 10 m (15 to 30 ft), but may be 3m (10 ft) or less in some dwarf varieties, or 18 m (60 ft) or more in date palms (Sunset, 1972). Crowns often do not touch, and are usually in a linear pattern. Spacing between trees is uniform depending on desired spread of mature trees. The understory is usually composed of low-growing grasses, legumes, and other herbaceous plants, but may be managed to prevent understory growth totally or partially, such as along tree rows.

Composition.-The California Agriculture- Statistical Review 1990 (California Department of Food and Agriculture, 1991) indicated that of the 10 evergreen orchard crops mentioned above was there were about 359,800 acres in production. Acres by type were approximately:

Avocados	75,000	acres
Dates	5,000	"
Olives	30,400	"
Grapefruit	19,200	"
Lemon	47,800	"
Oranges	175,100	"
Other Citrus	<u>7,300</u>	"
TOTAL	359,800	acres

The understory in evergreen orchards usually consists of bare soil (controlled by tillage and/or herbicides) or in a few instances a cover crop of herbaceous plants. The cover crop can be composed of either naturalized or planted domesticated herbaceous plants. Natural herbaceous plants commonly consist of perennial grasses such as Bermuda or johnsongrass; or annual grasses such as soft chess, annual ryegrass, wildoats, red brome, red fescue, barnyard grass, and others; or forbs such as wild mustard, fiddleneck, and filaree, depending on seed sources in the area.

Numerous grasses and legumes are planted as cover crops in evergreen orchards either as single species or in mixes. Cover crops of domesticated grasses and legumes generally fall into four categories (Finch and Sharp, 1981):

1) Annually seeded winter growing grasses and legumes such as cereal rye, barley, annual ryegrass and purple vetch;

2) Reseeding winter annual grasses and legumes such as Blando brome, zorro annual fescue, Wimmera-62 ryegrass, annual bluegrass, lana woolypod vetch, rose clover, crimson clover, bur clover, subclover, and black medic;

3) Summer annuals such as Sudan grass, grain, sorghums, and California blackeye bean; and

4) Perennial grasses and legumes such as tall fescue, creeping red fescue, orchardgrass, perennial ryegrass, narrowleaf trefoil, Salina strawberry clover, and ladino clover.

Other Classifications. - Most vegetation classification systems include evergreen orchards in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Evergreen orchards are planted in uniform patterns and intensively managed. They are usually established as sapling trees (2), and most are managed to grow to small trees (4) size. However, trees such as dates grow to size class medium/large trees (5). Canopy closure classes range from sparse (S) to dense (D). As trees become old or in some way damaged or diseased they are usually replaced. In some cases however, entire orchards may be replaced with young trees. A few orchards have been abandoned. They are eventually invaded by native or naturalized herbaceous plants followed by shrubs and trees. Orchards usually have some growth of herbaceous plants in the understory.

Duration of Stages. - Duration of evergreen orchards vary depending on species. Some are long lived, however most are replaced at approximately 35*-40 years old. Replacement of such orchards is usually a result of product price fluctuations or a decline in productivity.

Biological Setting

Habitat. - Orchards are typically associated with other agricultural types such as Irrigated Grain and Seed Crops (GRI), Row and Field Crops (RFC), Pasture (PAS), and some are near urban (URB) types. They are frequently associated with Valley-Foothill Riparian (VRI) areas, shrub habitats (Mixed chaparral (MCH), Chamise-Redshank Chaparral (CRC), and Coastal Scrub (CSC*)), herbaceous types such as Annual Grasslands (AGS), a few tree types such as Valley Foothill Hardwood (VFH), and Valley-Foothill Hardwood-Conifer (VHC).

Wildlife Considerations. - Evergreen orchards have been planted on deep fertile soils which once supported productive and diverse natural habitats. Larger and more diverse populations of wildlife were also supported by these native habitats. However, some species of birds and mammals have adapted to the orchard habitats. Many have become "agricultural pests" which has

resulted in intensive efforts to reduce crop losses through fencing, sound guns, or other management techniques.

Wildlife such as deer and rabbit browse on the trees; other wildlife such as squirrel and numerous birds feed on fruit. Cover crops can provide a source of food for wildlife that feed on seeds or herbaceous vegetation. Some wildlife (e.g. morning dove, California quail) are more passive in their use of the habitat for cover and nesting sites. Evergreen orchards can be especially beneficial to wildlife during inclement weather in winter or hot summer periods. Water can be beneficial in irrigated orchards. Many wildlife species act as biological control agents by feeding on weed seeds and insect pests. The literature is generally lacking on wildlife associated with these habitats except as it relates to pests and pest control. Evergreen orchards do not provide the food for wildlife that many of the deciduous fruit and nut trees provide.

Physical Setting

Evergreen orchards can be found on flat alluvial soils in the valley floors, in rolling foothill areas, or on relatively steep slopes. All are irrigated. Some flat soils are flood irrigated, such as with dates, but most evergreen orchards are sprinkler irrigated. Large numbers of orchards are irrigated by drip or trickle irrigation systems. Most evergreen orchards are in valley or foothill areas. Except for olive, most evergreen orchard trees are not very frost tolerant.

Distribution

In 1990 there were nearly 359,800 acres of evergreen orchards in California. Commercial evergreen orchards are grown in the warmer parts of California, because they are not very frost tolerant.

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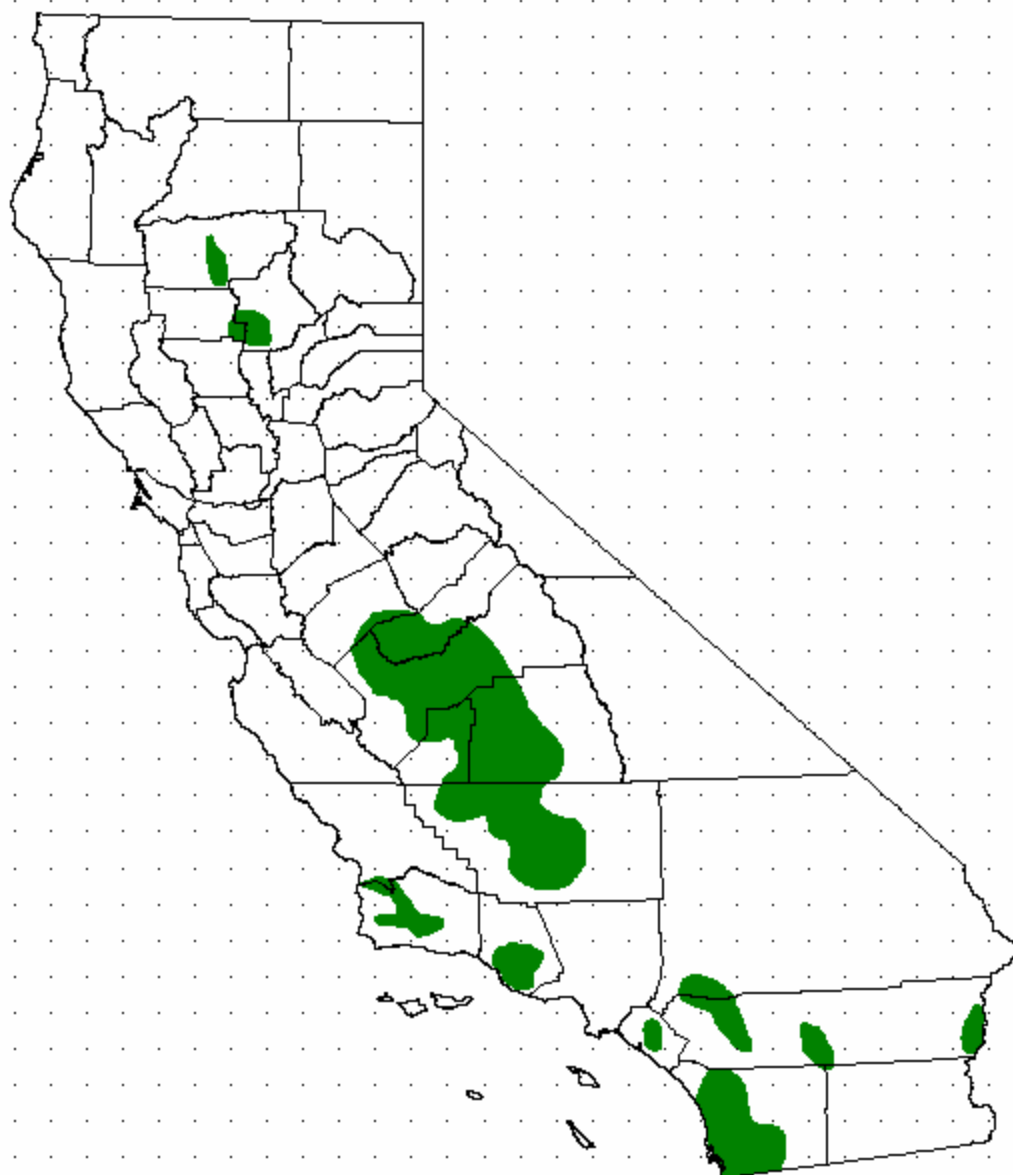
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EVERGREEN ORCHARD



VINEYARD

Ronald F. Schultze

Vegetation

Structure. - Vineyards are composed of single species planted in rows, usually supported on wood and wire trellises. vines are normally intertwined in the rows but open between rows. Rows under the vines are usually sprayed with herbicides to prevent growth of herbaceous plants. Between rows of vines, grasses and other herbaceous plants may be planted or allowed to grow as a cover crop to control erosion.

Composition. -The California Agriculture - Statistical Review 1990 (California Department of Food and Agriculture, 1991) indicated that there were 648,700 acres of vine crops grown in California during 1990. Approximate acres of these crops is listed below:

	500	acres
Boysenberries		
Olallieberries	200	"
Raspberries	1,700	"
Grapes	639,000	"
Kiwifruit	<u>7,300</u>	"
TOTAL	648,700	acres

The understory in vineyards usually consist of bare soil (controlled by tillage and/or herbicides) or a cover crop of herbaceous plants. The cover crop can be composed of either natural or planted domesticated herbaceous plants. Natural herbaceous plants commonly consist of perennial grasses such as Bermuda; or annual grasses such as soft chess, annual ryegrass, johnsongrass, wildoats, red brome, red fescue, barnyard grass, and others; or forbs such as wild mustard, fiddleneck, and filaree, depending on seed sources in the area.

Numerous grasses and legumes are planted as cover crops in vineyards either as single species or in mixes. Cover crops of domesticated grasses and legumes generally fall into four categories (Finch and Sharp, 1981):

- 1) Annually seeded winter growing grasses and legumes such as cereal rye, barley, annual ryegrass and purple vetch;
- 2) Reseeding winter annual grasses and legumes such as Blando brome, zorro annual fescue, Wimmera-62 ryegrass, annual bluegrass, lana woolypod vetch, rose clover, crimson clover, bur clover, subclover, and black medic;

3) Summer annuals such as Sudan grass, grain, sorghums, and California blackeye bean; and

4) Perennial grasses and legumes such as tall fescue, creeping red fescue, orchardgrass, perennial ryegrass, narrowleaf trefoil, Salina strawberry clover, and ladino clover.

Other Classifications. - Most vegetation classification systems include vineyards in more general categories such as Agriculture (California Department of Fish and Game, 1966), Urban/Agriculture (Parker and Matyas, 1981).

Habitat Stages

Vegetation Changes. - Vineyards are usually composed of young (2) or mature (3) shrub size classes and have sparse (S) or open (O) canopy closure classes. They usually have some growth of herbaceous understory.

Duration of Stages. -Duration of vineyards vary, depending on species. Generally, grapes will persist for over 40 years and will be replaced usually because of disease or abandoned because of economics.

Biological Setting

Habitat. -Vineyards are typically associated with other agricultural types such as Irrigated Grain and Seed Crops (GRI), Row and Field Crops (RFC), Pasture (PAS), and some are near urban (URB) types. They are frequently associated with Valley-Foothill Riparian (VRI) areas, shrub habitats (Mixed chaparral (MCH)), herbaceous types such as Annual Grasslands (AGS), a few tree types such as Valley-Foothill Hardwood (VFH), Valley-Foothill Hardwood-Conifer (VHC), and Ponderosa Pine (PPN).

Wildlife Considerations. -Vineyards have been planted on deep fertile soils which once supported productive and diverse natural habitats. Larger and more diverse populations of wildlife were also supported by these native habitats. However, some species of birds and mammals have adapted to the vineyard habitats. Many have become "agricultural pests" which has resulted in intensive efforts to reduce crop losses through fencing, sound guns, or other management techniques. Wildlife such as deer and rabbit browse on the vines; other wildlife such as squirrel and numerous birds feed on fruit. Some wildlife (e.g. morning dove) are more passive in their use of the habitat for cover and nesting sites. Vineyards can be especially beneficial to wildlife during hot summer periods. Because they are deciduous and relatively short, compared to orchards, they do not provide significant cover during cold and wet winter months. Water can be beneficial in irrigated vineyard. Many wildlife species act as biological control agents by feeding on weed seeds and insect pests. Raptor perches have been successfully used to attract raptors that feed on rodents and other crop pests. The literature is generally lacking on wildlife associated with these habitats except as it relates to pests and pest control. Poison baits are often used to control birds and other animals that feed on grapes and berries.

Physical Setting

Vineyards can be found on flat alluvial soils in the valley floors, in rolling foothill areas, or on relatively steep slopes. All are irrigated. Most vineyards are sprinkler irrigated. Large numbers of vineyards are irrigated by drip or trickle irrigation systems. Most vineyards are in valley or foothill areas.

Distribution

In 1990 there were about 648,700 acres of vine crops grown in California.

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VINEYARD

